

Claims:

1. A method of transmitting an optical communications signal, such method comprising the steps of:
  - disposing a plurality of optical gratings on a surface of an optically transparent substrate;
  - disposing an optical array having a plurality of optical ports adjacent the optically transparent substrate, such that an axis of transmission of the optical array passes directly through the substrate; and
  - transmitting a plurality of optical signals of the optical array substantially through the plurality of optical gratings in the substrate.
2. The method of transmitting an optical communications signal as in claim 1 further comprising defining the plurality of optical gratings in the substrate as mechanical etchings.
3. The method of transmitting an optical communications signal as in claim 1 further comprising defining the plurality of optical gratings as a plurality of laser etchings in the substrate.
4. The method of transmitting an optical communications signal as in claim 3 further comprising providing at least one locus of laser etchings disposed in the substrate for the plurality of optical ports.
5. The method of transmitting an optical communications signal as in claim 4 further comprising interposing an optically transparent underfill between the substrate and adjacent optical array, such that the plurality of transmission paths of the plurality of optical ports of the optical array pass directly through the optically transparent underfill.
6. The method of transmitting an optical communications signal as in claim 5 further comprising receiving the plurality of optical signals transmitted through the underfill, substrate and laser etchings into a respective plurality of optical fibers.

7. The method of transmitting an optical communications signal as in claim 6 further comprising coupling the plurality of optical signals through the underfill, substrate and gratings between the optical array and an optical connector.
8. The method of transmitting an optical communications signal as in claim 7 further comprising diffracting the plurality of optical signals of the plurality of optical ports of the optical array when the plurality of optical signals pass through the plurality of laser etchings.
9. An apparatus for transmitting an optical communications signal, such apparatus comprising:
  - an optically transparent substrate;
  - an optical array, having a plurality of optical ports, disposed on a surface of the optically transparent substrate, such that a plurality of transmission paths of the optical array pass directly through the substrate; and
  - a plurality of optical gratings disposed on a surface of the substrate, such that the transmission paths of the optical array pass substantially through the plurality of optical gratings.
10. The apparatus for transmitting an optical communications signal as in claim 9 wherein the plurality of optical gratings disposed in the substrate further comprise a plurality of mechanical etchings in the substrate.
11. The apparatus for transmitting an optical communications signal as in claim 9 wherein the plurality of optical gratings disposed in the substrate further comprise a plurality of laser etchings in the substrate.
12. The apparatus for transmitting an optical communications signal as in claim 11 further comprising at least one locus of laser etchings disposed in the substrate for the plurality of optical ports.
13. The apparatus for transmitting an optical communications signal as in claim 12 further comprising an optically transparent underfill interposed between the substrate and optical array,

such that the plurality of transmission paths of the plurality of optical ports of the optical array pass directly through the optically transparent underfill.

14. The apparatus for transmitting an optical communications signal as in claim 13 further comprising a means for receiving the plurality of optical signals transmitted through the underfill, substrate and optical gratings, from the plurality of optical ports of the optical array.

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